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ABSTRACT

The three-year plan includes development of a State industrial arts guide, development of instructional materials common to all existing programs, and inservice teacher education for program implementation. To date only the first phase has been completed, with total project completion scheduled for the next three years. Master plan committee members, secondary school industrial arts instructors, and State education representatives, attended a series of leadership development workshops. This committee was responsible for establishing priorities, soliciting industrial arts input on a Statewide basis, evaluating materials, and recommending guidelines. The major topics of the guide developed for industrial arts education in North Dakota include: philosophy and goals, curriculum structure and content base, industrial arts physical facilities, teacher qualifications, criteria for reimbursement of industrial arts programs, and operational guidelines. The guide will be used as the framework for development of instructional materials in the second phase. (KJ)

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FINAL REPORT

SUGGESTED MASTER PLAN FOR INDUSTRIAL ARTS PROGRAMS IN NORTH DAKOTA SCHOOLS

Project No. RCU 22

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UNIVERSITY OF NORTH DAKOTA

GRAND FORKS, NORTH DAKOTA 58202

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July, 1975

in cooperation with

NORTH DAKOTA STATE BOARD

FOR VOCATIONAL AND TECHNICAL EDUCATION

Bismarck, North Dakota

(VT-102-372)

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ACKNOWLEDGMENTS

The "Master Plan For Industrial Arts Programs In North Dakota Schools" project was an attempt to develop a plan that will provide direction in the development, improvement, and administration of industrial arts educational programs in the State.

It was a cooperative effort involving the State Board For Vocational Education, State Department of Public Instruction, industrial arts teacher preparatory institutions, school administrators, and selected classroom teachers. Sincere appreciation is expressed for the efforts of everyone involved with the project. A special thanks to Mr. Carrol E. Burchinal and Mr. Larry Selland for their able assistance to the Master Plan Committee.

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ABSTRACT

The industrial arts educational programs in North Dakota schools has been in existence for many years. During that time several attempts were made to provide some direction to the programs but little success resulted from these efforts. Most of the programs were conducted in a laissez-faire manner, at the discretion of the local administration. Those successful programs which are in operation resulted from strong local leadership and genuine interest in a quality program.

One vital ingredient for the promotion and establishment of successful programs that North Dakota lacked was that of a supervisor for industrial arts at the state level. In 1974 the State Board for Vocational Education appointed a supervisor in an attempt to provide a uni-directional approach to the development and improvement of industrial arts programs.

The establishment of the supervisory position, while a vital and needed step, did not guarantee a successful operating program. The whole philosophical realm of industrial arts had to be studied in detail to provide a realistic approach to the role of industrial arts in the total education process in North Dakota. Industrial arts instructors recognized the need for direction and professional rejuvenation. Leading this movement for change was the North Dakota Industrial Arts Association and the newly appointed supervisor for industrial arts in the State Department for Vocational Education.

This recognition of need prompted the "Master Plan" project as an attempt to provide direction for industrial arts programs. The Master Plan Project was the first phase of a proposed three-fold program that was identified from the outset as follows:

Phase I: Develop a Master Plan for Industrial Arts Programs in North Dakota.

Phase II: Develop instructional materials common to all existing programs.

Phase III: Conduct inservice teacher education programs for the implementation of the proposed new program.

The "Master Plan" phase addressed itself to the following specific objectives:

1. To determine the philosophy for conducting industrial arts programs.
2. To establish objectives for industrial arts education.
3. To identify a curriculum structure.
4. To provide directional guidelines for industrial arts facility planning.
5. To determine the articulation process for industrial arts programs from the elementary level to secondary school offerings.
6. To establish recommended instructor certification requirements.
7. To determine the feasibility of sharing facilities and/or equipment with existing vocational education programs.
8. To establish guidelines or operational procedures for the promotion and continuance of industrial arts programs.

The "Master Plan" committee, which was composed of representatives from secondary schools across the state, after much research and study developed a guide over a six month period beginning January through June 1975. During this time the committee obtained considerable direction from recent research findings and curriculum concepts in industrial arts.

The major concern of the committee which prepared the guide was total curriculum improvement. Therefore, the material presented is effective only within the framework of a complete plan administering an industrial arts educational program. The "Suggested Master Plan" developed represents only one phase of a three-phase plan which begins with: (1) philosophical rationale of industrial arts education; (2) goals for industrial arts; (3) curriculum structure; (4) guidelines for industrial arts instructional facilities; (5) total articulation of programs; (6) teacher certification recommendation; (7) feasibility of sharing instructional facilities and/or equipment with other programs in a school; and (8) suggested operational procedures for the promotion of industrial arts programs.

In summary, the Suggested Master Plan for Industrial Arts Programs in North Dakota Schools may be utilized as an effective guide in the development and improvement of industrial arts educational programs. It must be emphasized that effective utilization of the guide is contingent upon the realization that it is a directional device and only one element of a program of curriculum improvement.

METHODS AND PROCEDURE

The major activity of the total Master Plan was divided into three phases. Phase I was the development of a State industrial arts guide. Phase II was proposed for the development of instructional material in all areas, and Phase III was proposed to provide for inservice education of teachers for implementation preparation. Only Phase I was completed this fiscal year ending June 30, 1975. The other two phases are projected to be completed in the next two or three years.

Prior to the initiation of the "Master Plan" project, a series of "Leadership Development Workshops" funded under the Education Professional Development Act were conducted in the State in an effort to promote professional improvement. This effort, on a regional basis provided resources and instructor competencies for the Master Planning activity. Selected teachers involved in the EPDA workshops served as resource or committee members in this project.

Organization of Project

The initial step of the project was the selection of participants to form the "Master Plan" committee. The committee formulated included eight industrial arts instructors from secondary school education programs in North Dakota. To allow for State-wide input, two instructors were chosen from each of the four regions in the State and having equal representation from large and small schools.

Due to the nature of the project, the personnel involved were individuals who have exhibited leadership and professional growth in the field of teaching industrial arts. The eight instructors selected were actively involved in teaching at the secondary level.

In addition to the classroom teachers, ten consultants were identified and appointed as members of the "Master Plan" committee. These served primarily as resource persons and were selected on the basis of background and positions related to industrial arts education. This group consisted of representatives from each of the two industrial arts teacher preparatory programs in the State, a career education consultant, a State vocational education representative, the State industrial arts supervisor, a public school superintendent, a public school principal, a vocational education local director, and a representative from the State Department of Public Instruction. This committee served as the governing force throughout the project but solicited input from the industrial arts teachers in the State.

An organizational meeting was held to establish a list of priorities and to review national trends for industrial arts for the purpose of establishing a base from which to work. Prior to this meeting, resource materials were obtained from other states to determine the methods that have been developed across the nation. State supervisors were contacted by mail in an attempt to obtain the needed resource materials.

The materials were then evaluated to determine possible incorporation into North Dakota's Master Plan by members of the committee. Through the review of the materials obtained, it became quite apparent that numerous changes could be made in the present industrial arts program in North Dakota.

After the priorities were established, sub-committees were appointed to one of the specific objectives for further research and study. The sub-committees met to direct attention toward specific assignments and

were asked to solicit assistance of recognized leaders and resource personnel to develop proposed guidelines for each objective being studied.

Each sub-committee prepared recommendations on their findings that were presented to the committee as a whole at the regular meetings. The adoption of each guideline or objective was obtained as a result of majority decisions. The first draft of the master plan guide was developed by the various subcommittees that again was discussed and revised by the committee as a whole. From these discussions and consensus by the committee, a final draft copy of the guide was prepared. The final presentation of the suggested recommendations to the committee and the respective adoption of those recommendations were presented to members of the State Board for Vocational Education for consideration and appropriate action.

RESULTS AND FINDINGS

Today we live in what has been commonly called a technological world. We are becoming increasingly aware of the significance of technology and its impact on human affairs -- both as a creative and destructive force. Technological and environmental literacy is essential to control this force for the benefit of man.

It seems obvious that schools must continually examine society if they are to maintain effective programs in industrial arts and other educational disciplines.

While the name Industrial Arts is a 20th century invention, the philosophical basis for it derives from the characterization of the human being as a tool-using creature. Industrial arts as a school function is intended to provide for technological and environmental literacy through an understanding of how tools, materials and processes are used to shape the environment.

The decade of the 1960's saw a surge of experimental and innovative programs in industrial arts education. There were many major projects in industrial arts education and while no single program has been fully accepted by the profession as optimum, the combined weight of perhaps as many as thirty has at least three effects:

(1) It has emphasized that industrial arts education is more than a study of the tools, materials, and processes of selected skilled trades and should encompass all the elements of industrial technology.

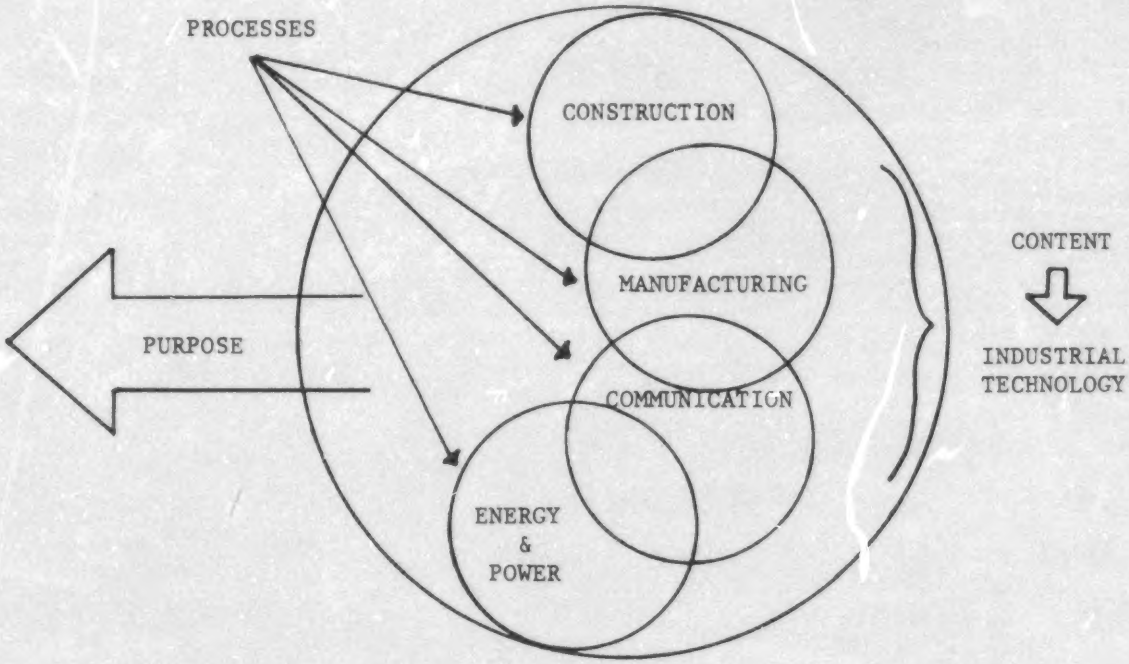
(2) It has offered a variety of approaches and stimulated teachers to question which program or what parts of several programs will be appropriate for their students.

(3) A new wave of concern for career education in the elementary and secondary schools appeared in the late 1960's. This has strong implications for industrial arts education for aiding students in occupational awareness and preparation.

The Master Plan Guide for Industrial Arts Programs in North Dakota was designed to reinforce and extend these effects.

Curriculum Structure

The increased rate of change in industrial technology, the knowledge explosion, and student demands for relevance in education demand change in structuring content. Current trends are along a thematic cluster approach including (1) construction, (2) manufacturing, (3) communications, (4) energy and power, and (5) transportation technology. This approach lends itself to a system as an assemblage of instructional units united by some form of regular interaction or interdependence organized into a whole (Industrial Technology).



The outer circle represents the vast body of knowledge while the inner circles represent the thematic cluster areas. Each of the inner circles can be furtner divided into specific technical units. The significance of this approach to curriculum development for industrial arts education is that it comprises of interrelated and interacting components to function in an integrated fashion to attain predetermined purposes. The instructional system is built from parts or components, and the sum of these is the content for the study of industrial technology.

Curriculum & Learning Environment Changes

The system approach to the study of industrial technology in industrial arts programs requires basic changes in the areas of curriculum and the learning environment. These changes are:

Curriculum

* broadly-based study of technology
* flexible curriculum structure
* flexible response to student interest
* knowledge and activity based instruction
* elimination of sacredness in content
* elimination of rigidly-applied requirements for manipulative skill development
* greater emphasis on creative exploration
* increased recognition of the value of experimentation
* recommittment to the development of uniquely human relationships based upon common interests, cooperation, and emotional security
* greater emphasis on career education

Environment

* more flexibly-designed laboratories with emphasis on diversification
* greater emphasis on experimentation -- de-emphasis of content prescriptions
* greater use of the mobile classroom and neighborhood involvement
* increased use of community resources, including industrial centers and libraries
* less cost and more options

Suggested Master Plan Guide for Industrial Arts Education In North Dakota Schools

The guide that was developed for this project provides a realistic approach to the role of industrial arts education in the State of North Dakota. It was an attempt to incorporate findings of research for effective implementation for further curriculum development. The major topics included in the guide are: (1) philosophy & goals; (2) curriculum structure and content base; (3) industrial arts physical facilities; (4) industrial arts teacher qualifications; (5) recommended criteria for reimbursement of industrial arts programs; and (6) guidelines for operational procedures.

Philosophy of Industrial Arts

Industrial Arts education is that discipline area that develops an awareness and understanding of industry and technology. It provides opportunities for all students from elementary through adult and higher education to develop an understanding about the technical, consumer, occupational, recreational, organizational, managerial, social, historical, and cultural aspects of industry and technology. Students acquire,

through meaningful classroom and laboratory experiences, industrial-technical knowledge and ability in creative problem-solving, designing, constructing, and evaluating with the use of tools, machines and materials.

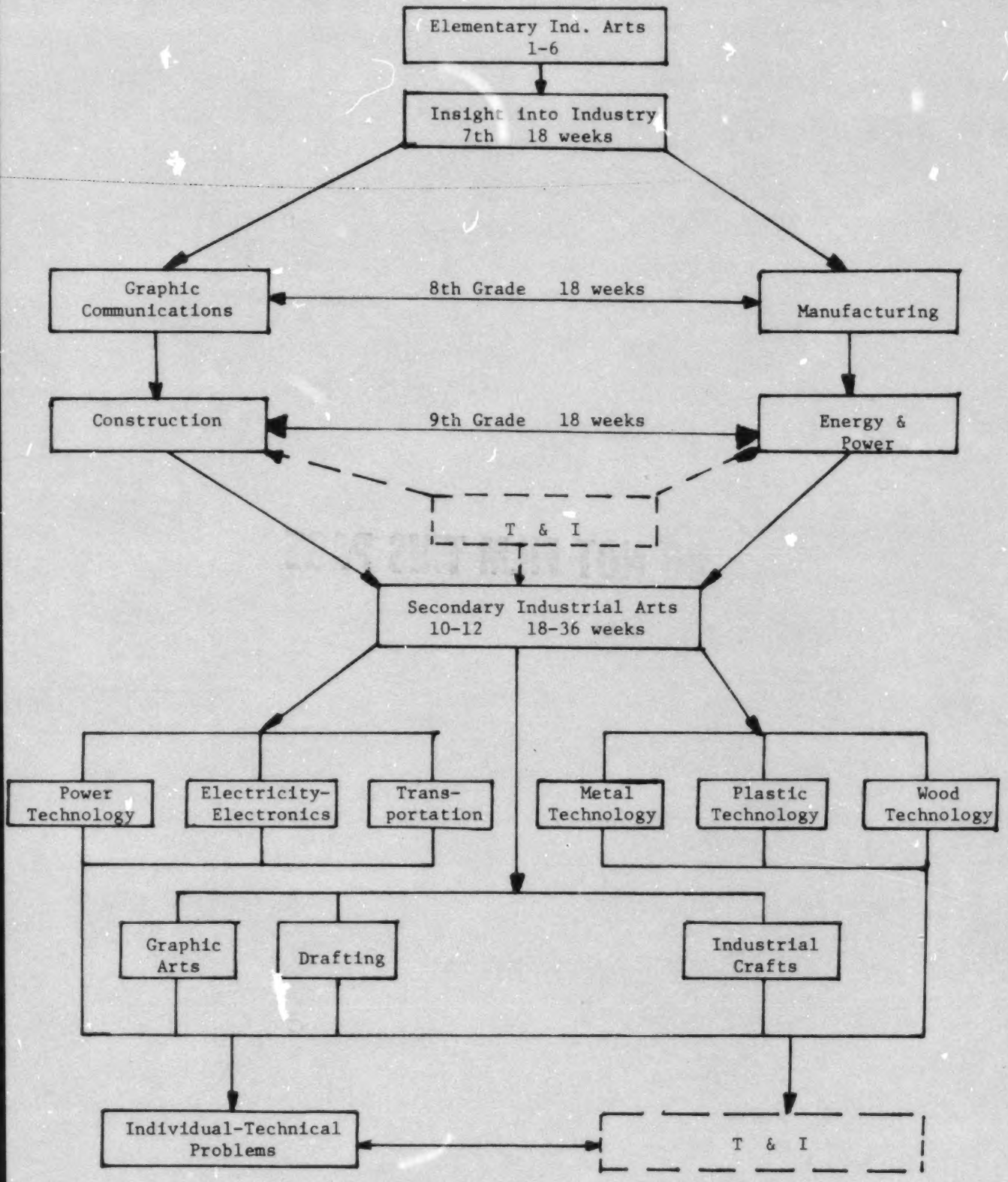
Industrial Arts derives its content from industrial technological developments and the need for effective living in a changing society. Industrial arts education involves students in activities that help them to grow and develop self-direction, continuous learning and creativity. Furthermore, it provides avenues for making other subject areas more relevant, assists students in making meaningful career choices with ecological responsibilities and prepares the individual for further learning in a professional or technical field.

Goals

The primary goals of industrial arts education are to assist students:

1. To develop an insight and understanding of industry and technology and its place in our society.
2. To discover and develop attitudes, interests, and individual potential related to the industrial-technical and avocational areas.
3. To develop problem-solving and creative abilities involving tools, materials, processes, and products of industry.
4. To develop abilities in the safe and proper use of tools, machines and processes through a wide range of exploratory classroom and laboratory experiences.
5. To develop career awareness, pre-vocational experience and information dealing with the world of work and occupational opportunities in industry.
6. To become an effective consumer and/or producer in an industrial-technical society.

CURRICULUM STRUCTURE AND CONTENT



Industrial Arts at the Elementary Level (K-6)

In order for education to prepare children for the society in which they live it is necessary to draw some content from industry and its technologies. This area, called Industrial Arts, will make a student's understanding of the world around him more meaningful. Through the use of classroom and laboratory experiences, knowledge about technology and its processes, personal development of psychomotor abilities, attitudes, and insights of how technology influences society will be gained.

Although the already overcrowded area of elementary education may not allow time for individual sessions in industrial arts the following recommendations are made:

I. Industrial arts be incorporated into the self-contained classroom to relate and make other subject areas more relevant.

II. With the aid of an industrial arts instructor lessons using portable tool carts be introduced into the elementary classroom.

III. With the aid of an industrial arts instructor students be brought into an industrial arts laboratory to gain experiences in some aspects of the cluster areas of graphic communications, energy and power, construction, and manufacturing.

IV. As the elementary industrial arts program progresses a separate laboratory with a qualified instructor be organized to handle its needs.

V. Techniques such as field trips, role playing, and hands-on activities be included in the elementary curriculum for the purpose of career awareness and exploration.

The recommended sequence of beginning industrial arts courses is outlined below; however, recognizing the diversity of programs throughout the state the level at which they are offered may vary. It is imperative that the first offering be Insights Into Industry followed by a minimum of two of the four outlined clusters.

Insight Into Industry
7th Grade
Six weeks to 18 weeks

This course is to give a broad exposure to the fundamental concepts in construction, manufacturing, graphic communications, and energy and power. It will provide an orientation to career opportunities and the functions of industry with emphasis on solving practical problems relating to laboratory experiences using the tools and materials of industry.

Graphic Communication
8th or 9th Grade
18 weeks

Graphic Communications is a study of the basic process of graphic communications included in the broad areas of drafting and design and graphic arts. Learning experiences may include drawing and sketching, block printing, letterpress printing, lithography, photography, rubber stamp construction, silk-screen printing, type composition, and binding. The content includes the history, economics occupations, and consumer information related to the graphic communications industry.

Manufacturing
8th or 9th Grade
18 weeks

Manufacturing is a study of information and skills concerning manufacturing processes, organization, and occupations, utilizing a variety of materials. It should provide an opportunity for each student to become familiar with the industrial society. The study of the manufacturing industry will help each student understand what people who work in manufacturing do. It is the study of tools, materials, and processes needed in the manufacturing phase of industry. It will provide learning experiences that will fulfill the growing demand for educational programs that deal with important industrial and technological concepts.

Construction
8th or 9th Grade
18 weeks

This course is designed to provide students with an opportunity to better understand construction technology, and to provide education-occupational guidance for the world of work. It provides the student with mental images of construction concepts; the tools, materials and processes that are used on a construction site. The learning experiences are for all students; it centers around construction activities, management and production practices as they relate to the construction industry.

Energy and Power
8th and 9th Grade
18 weeks

Energy and power is a study to acquaint students with power technology, electricity and electronics in development, transmission, and utilization

of power. Learning experiences include theory, maintenance and servicing of machines and devices for the conversion of power into useful forms. Topics covered include energy sources, energy conversion, power transmission, and application with emphasis on careers, methods, machinery, and exploration in the area of power.

Industrial Arts at the Senior High School

Industrial Arts
Grades 10, 11, 12
½ to 1 credit each

At the senior high level an optional system may be implemented. This system includes vocational skill oriented courses and industrial arts courses. The senior high industrial arts courses are characterized by the beginning of specialization and technical orientation. The courses are derived from the four broad cluster areas of manufacturing, construction, graphic communications, and energy and power.

Manufacturing/Construction Cluster Area:

1. Wood Technology
2. Plastic Technology
3. Metal Technology
4. Material Science
5. Industrial Crafts
6. Individualized Technical Problems

Graphic Communication Cluster Area:

1. Graphic Arts

2. Design/Drafting

3. Production Drafting

4. Architectural Drafting

5. Photography

6. Individualized Technical Problems

Energy and Power Cluster Area:

1. Electricity/Electronics

2. Power Technology

3. Transportation Technology

4. Application of Electronics

5. Individualized Technical Problems

Industrial Arts Facilities

Industrial arts education requires a laboratory setting as a unique learning situation in which the learner may experiment, test, construct, disassemble, repair, design, create, imagine, and study. Active laboratory experiences are essential to the study of industrial arts.

Because industrial arts is a study of industrial technology, the facilities include the tools and machines which simulate an industrial environment in an educational setting. Proper planning of the physical layout is a serious responsibility if the investment is to be sound and the educational program productive. True planning must identify the program philosophy, specific objectives, teacher and pupil activities, enrollments to be served, financial resources, course content, and laboratory equipment before these are converted into graphic form. Industrial arts laboratories are designed to reflect the curriculum and the desired level of education.

Because of the scope of industry, its wide spectrum of processes and materials, no single physical solution can fulfill the requirements of all situations. This document is intended to serve as a guide to local school districts and their decisions in the preparation of educational specifications for industrial arts facilities.

The square footage recommendation for industrial arts and the adjacent auxiliary spaces should reflect the North Dakota Guide for School Buildings and applicable code regulations. Federal and state safety regulations contain provisions on operator spaces, work stations, and traffic lanes which relate to space considerations. It is recommended that an industrial arts laboratory course have a maximum enrollment of 20 students. The number of students enrolled per period should not exceed the number of individual work stations provided in the laboratory.

Minimum Recommendations for Laboratories (Maximum of 20 students)

Recommended Laboratory Sizes for Exploratory Industrial Arts Courses in Junior High Schools.

1.	Manufacturing Laboratory	2400 sq. ft.
	Materials Storage	600 sq. ft.
	Student Project	300 sq. ft.
	Finishing Room	150 sq. ft.
	Total	3450 sq. ft.
2.	Graphic Communications Laboratory	
	Drafting Area	800 sq. ft.
	Graphic Arts Area	800 sq. ft.
	Drafting Room Storage	150 sq. ft.
	Graphic Arts Storage	200 sq. ft.
	Dark Room	150 sq. ft.
	Total	2100 sq. ft.
3.	Energy and Power Laboratory	2400 sq. ft.
	Engine and Materials Storage	200 sq. ft.
	Fluidic Instruments and Equipment Storage	150 sq. ft.
	Electrical Equipment Storage	150 sq. ft.
	Total	2900 sq. ft.

4.	Construction Laboratory	2400 sq. ft.
	Equipment Storage	300 sq. ft.
	Material Storage	300 sq. ft.
	Desired Outdoor Covered Area	400 sq. ft.
	Total	3400 sq. ft.
5.	Department Instructional Area (Classroom) (To be used by all industrial arts teachers for lectures and audio-visual presentations)	600 sq. ft.
6.	Department Office Space	100 sq. ft. per teacher

Recommended minimum Laboratory Sizes for Senior High Schools:

1.	Drafting	800 sq. ft.
	plus storage space	150 sq. ft.
	Total	950 sq. ft.
2.	Power Technology Laboratory	1920 sq. ft.
	plus engine and materials storage	200 sq. ft.
	test and precision equipment storage and small parts	100 sq. ft.
	Optional Outdoor Covered Paved Area	600 sq. ft.
	Total	2820 sq. ft.
3.	Electronics Laboratory	1440 sq. ft.
	plus equipment and student storage	200 sq. ft.
	Optional Radio Ham Station Room	75 sq. ft.
	Total	1715 sq. ft.
4.	Manufacturing and Construction Laboratory (Requires additional space in open area to accomodate the highly diversified equipment and activities.	3000 sq. ft.
	plus materials storage	300 sq. ft.
	Student Project Storage	300 sq. ft.
	Finishing Room	150 sq. ft.
	Total	3750 sq. ft.
5.	Graphic Arts Laboratory (Printing)	1920 sq. ft.
	plus materials storeroom	200 sq. ft.
	Dark Room	150 sq. ft.
	Total	2270 sq. ft.
6.	Department Classroom (used by all teachers for lectures and audio-visual presentations)	600 sq. ft.
7.	Department Office Space (planning area)	100 sq. ft. per teacher

Industrial Arts Teacher Qualifications

Elementary (36 semester hours or 54 quarter hours)

A. Three semester hours in each of the following areas:

1. Manufacturing
2. Construction
3. Graphic Communication
4. Power and Energy

B. Well distributed electives in the following areas: Industrial crafts, Drafting, Electricity/Electronics, Graphic arts, Power technology, Wood technology, Plastics technology, Metal technology, and Transportation technology.

C. A successful student teaching experience in Industrial Arts in the elementary level. This may be a part of the total student teaching program.

Junior High and Secondary Industrial Arts (44 semester hours or 66 quarter hours major)

A. Four semester hours in each of the following:

1. Manufacturing
2. Construction
3. Graphic Communications
4. Power and Energy

B. Three semester hours in any specific area to be taught such as:

1. Electricity/Electronics
2. Drafting
3. Graphic Arts
4. Power Technology
5. Wood Technology
6. Metal Technology
7. Plastics Technology
8. Transportation Technology

C. A successful student teaching experience in at least two of the major cluster areas of Industrial Arts.

D. The benefit of a concentrated study in one of the cluster areas is encouraged.

E. The value of work experience is also recognized but is not necessary to meet industrial arts teacher qualifications. It is recommended that inservice credit be given for work experience by local school systems.

Criteria For Reimbursement Of Industrial Arts Programs

Schools must meet the following criteria and those stated by the State Board for Vocational Education:

1. Instructor Qualification -
   A. Bachelor Degree in Industrial Arts
   B. Refer to section on teacher qualification in this document
   C. 1200 hours of cumulative work experience in related areas of Industrial Arts by September 1, 1980.

2. Minimum Class Size - (10-12) students; Maximum 20 students

3. Class Time - Minimum 220 minutes per week.

4. The guidelines for facility planning should be adhered to on the construction of all new facilities for Industrial Arts. Existing facilities that do not meet specified guidelines should be approved by the State Board for Vocational Education prior to funding of programs.

5. Grade Levels - Grades 7, 8, 9, 10, 11, and 12 funding on a formula basis for equipment and instruction.

6. Instructor expected to attend inservice training programs in the cluster areas.

7. Beginning Programs - A minimum of two cluster areas (18 weeks each) plus offering "Insights to Industry" (6-18 weeks) to be eligible for partial reimbursement or all five areas for total reimbursement on the formula basis.

   Secondary Programs (18-36 weeks) - Course titles alone do not guarantee student outcomes which are essential for reimbursement on the formula basis.

   It will probably always be necessary to individually assess courses and programs before approval.

Guidelines for Operational Procedures

Inservice Programs

It is recommended that administrators allow instructors to attend inservice teacher education programs that are relevant to the teaching of industrial arts. There should be professional leave set aside for this type of activity. Instructors should be given time to observe other industrial arts teachers during the school year.

Extended Contract

It is recommended that industrial arts instructors be offered an extended contract for a minimum of two weeks for servicing and repairing industrial arts instructional laboratory equipment and to attend the All-Service conference with expenses reimbursed.

Promotion

It is recommended that in order to promote Industrial Arts, a certain amount of display area be provided. Instructors should be encouraged to have open house, an Industrial Arts club, etc.

New Programs

It is recommended that any expanding of existing programs or establishing of new ones should be approved by the State Supervisor for Industrial Arts before being implemented. It is further recommended that all building plans be approved before construction begins.

Professional Memberships

It is recommended that instructors of industrial arts belong to professional organizations, for example:

-North Dakota Industrial Arts Association
-American Industrial Arts Association
-North Dakota Vocational Association
-American Vocational Association

Class Load

It is recommended that special consideration should be given to providing laboratory teachers with additional time for maintaining equipment and inventories and the storage and preparation of materials. Power machines require periodic sharpening, lubrication, maintenance adjustments, and overhaul. Longevity of equipment life and safety can only be assured by proper maintenance.

Teacher Education Programs

It is further recommended that inservice teacher programs be conducted by teacher education institutions during the school year and also during the summer months to allow the teachers already in the field an opportunity to adequately prepare themselves.

Sharing of Facilities and Equipment

It is recommended that the sharing of equipment and facilities is encouraged between industrial arts and other service areas of vocational education. It should be realized by the individuals sharing facilities that complete cooperation must be maintained to create effective learning conditions.

CONCLUSIONS AND RECOMMENDATIONS

The Suggested Master Plan Guide for Industrial Arts Programs has been prepared to assist teachers and school administrators in improving the quality of instruction in industrial arts education in North Dakota schools. The content contained carefully avoids being prescriptive in seeking to be truly a guide for further study. It may be considered a directional device to assist industrial arts teachers and administrators in their efforts to provide a quality instructional program within current curriculum and planning learning environment trends and research. A curriculum structure is presented to encompass the broad scope of industrial arts subject matter at the elementary and secondary levels. Through a unique system approach to the offerings of industrial arts subjects, it suggests diversification of content and avoids duplication.

The guide suggests that industrial arts education should, because of its fundamental nature, be an integral part of the school program and be available to all pupils. It draws its content from industry and its technology, an important subject to both boys and girls because man has civilized himself through the ages through technology -- which can be broadly defined as man's efforts to make use of the way nature is, to achieve specific, practical ends. The technology content cannot be dismissed as merely manual or mechanical, and therefore unworthy of academic consideration. Technology is the essential component of our culture, affecting and affected by, every other aspect of society.

It seems obvious that schools must continually examine society if they are to maintain effective programs. But in recent years, this need for examination has heightened by the accelerating technological advance, increasingly evident environmental problems, and reappraisal of personal values.

The guide is only a framework for development of curricula and total industrial arts education programs. It is obvious that if this publication serves even a part of its purpose, change will be the result. The guide is meant to be of aid in making evolutionary changes in existing operations of industrial arts programs.

Furthermore, the guide that was developed will be utilized during Phase II of the total Master Plan project. The projected usage will be to aid in the development of instructional material. This material will be developed by determining what material exists and modifying this material to meet the requirements established by the Master Plan committee.

In summary, it must be emphasized that effective utilization of the guide is contingent upon the realization that it is a directional device, a guide is only one element of a program of curriculum improvement, and the classroom teacher must be prepared to use the materials.

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